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EXAMINER	
TRAN, BINH X	

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/845,454
Filing Date: April 30, 2001
Appellant(s): RANGARAJAN ET AL.

Deborah L. Corpus
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 4-26-2004.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

The rejection of claims 1-12, 25 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

6,483,580	Xu et al.	11-2002

6,486,492	Su, Bo	11-2002
6,113,733	Eriguchi et al.	09-2000
6,117,791	Ko et al.	09-2000
5,711,843	Jahns, Gary L.	01-1998

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

10a. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eriguchi et al. (US 6,113,733) in view of Su (US 6,486,492).

Eriguchi discloses a system for monitoring and regulating etch process comprising:

at least one etching component (i.e. gas inlet 609 or heater 604) operative to etch at least one portion of a wafer (103) (Fig 18);

an etch component driving system (608, control flow meter; or heater) for driving the at least on etching component;

a system (611 or 612) for directing light toward one or more gratings located on at least one portion of the wafer (Fig 3, Fig 18, Fig 30);

an etch monitor system (613) operate to measure one or more etching parameters from the light reflected from the one or more gratings (Fig 18, col. 37 lines 45-55);

a computer (615) (read on "processor") operatively coupled to the etch monitoring system (613) and the etch component driving system (608), wherein the

computer receives an etching parameter data from the measuring system (613) and analyzes the etching parameter (Fig 18).

Eriguchi also discloses that the computer analyzes the etching parameter by comparing the etching parameter data to stored etching data (i.e. initial value) to generate a control date to control with the etching component (Fig 1). Eriguchi fails to disclose that the control is a feed-forward control data. In a system for monitoring etching process, Su discloses that the control is a feed-forward control data to control the etching component (abstract). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Eriguchi in view of Su by using a feed-forward control data because it will improve critical dimension during the etching process.

10b. Claims 2-6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eriguchi and Su as applied to claim 1 above, and further in view of Xu et al. (US 6,483,580).

Respect to claim 2, Eriguchi and Su fail to disclose the use of scatterometry system. However, Eriguchi clearly discloses the use of ellipsometric system for processing the light reflected from the one or more grating (col. 9 lines 25-50). In a semiconductor method, Xu discloses the use of scatterometry system to obtain an ellipsometric signature. It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Eriguchi and Su in view of Xu by using the scatterometry system because equivalent and substitution of one for the would produce an expected result.

Respect to claim 3, Eriguchi discloses that the computer coupled to the spectroscope, the computer analyzes data received from the spectroscope and produces an analyzed date (Fig 11, 18, col. 37). Eriguchi further discloses the computer control the etching component (i.e. gas inlet or temperature) via the etching component driving system (heater or flow rate control meter). The limitation regarding scatterometry system has been discussed above.

Respect to claim 4, Eriguchi discloses the etch process is the main etching (Fig 1). Respect to claim 5, Eriguchi discloses the etch process is an anisotropic etch process (Fig 2a-2c). Respect to claims 6 and 8, Eriguchi discloses the mechanism of the etch process is a chemical basis such as plasma etching technique (abstract).

10c. Claims 7, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eriguchi, Su and Xu further in view of Ko et al. (US 6,117,791).

Respect to claims 7, 9, Eriguchi discloses the dry etching process is a plasma etching process or a sputtering etching (col. 33 lines 57-61). However, Eriguchi fails to disclose specifically that the dry etching is one of reactive ion etching or glow discharge sputtering. Ko discloses that the dry etching including RIE and glow discharge sputtering (col. 2 lines 8-22). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Eriguchi, Su, and Xu in view of Ko by using either RIE or glow discharge sputtering because these techniques are capable of accurately reproducing the features of a protective mask.

10d. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jahns (US 5,711,843) in view of Su and further in view of Xu.

Jahns discloses a system for monitoring the etching process comprising:

a spectrometer with a detector array for sensing the acceptability of etching in at least one of the grid blocks of the wafer (Fig 7);

means for controlling (controller 707) the etching of a wafer portion (Fig 7);

means for selectively controlling (computer 706) the means for etching (Fig 7, col. 11 lines 30-61)

Jahns discloses a spectrometer with a detector for sensing the acceptability of the etching. However, Jahns fails to specify that the spectrometer is scatterometry. Xu discloses a spectroscopic scatterometer. It would have been obvious to one having ordinary skill in the art, at the time of invention to modify Jahns in view of Xu by using a scatterometry means because equivalent and substitution of one for the other would produce an expected result.

Jahns also fails to disclose means for partitioning a wafer into one or more grid block. Su discloses a means for partitioning a wafer into one or more grid block (col. 5 lines 6-18, Fig 1). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Jahns and Xu in view of Su by including a means for portioning a wafer into one or more grid because allow multiple patterns on the wafer.

Allowable Subject Matter

10e. Claims 10-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

(11) Response to Argument

Appellants argue that Eriguchi "does not disclose, teach or suggest directing light towards one or more grating ... and measuring one or more etching parameters from light reflected from the one or more grating". According to appellants, Eriguchi never mentions the term "grating". The examiner disagrees with this argument. First the examiner recognizes that Eriguchi does not explicitly use the term "grating" in the specification. However, Eriguchi clearly discloses that wafer can be divided into sub-region and the sub-region is subjected to optical evaluation (Fig 3). The examiner interprets the sub-region in Figure 3 of Eriguchi read on the limitation of "one or more grating". Further, Eriguchi clearly teaches to direct light beams on to the sub-region of the wafer for optical evaluation. This teaching certainly read on the limitation of "directing ...light onto one or more gratings" as recited in claim 1

Appellants further point out that Eriguchi "teaches a system for detecting defects in a semiconductor region via emitting two light beams" whether the appellants invention use a "single light beam". This argument is not commensurate with the scope of the claims because the applicants use the transitional term "comprising" in the preamble. According to the MPEP 2111.03, the transitional term "comprising" is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. The examiner still maintains that at least one light beams (611 or 612) in Eriguchi's reference certainly reads on appellant's single light beam.

Appellants further argue "the present invention as claimed can control size, shape, and location of features as well as size, shape and location of spaces between such feature". According to the appellants, "Eriguchi, et al. cannot measure size, shape

and location of feature". This argument is commensurate with the scope of the claim. There is no limitation in the claim, which indicates a specific parameters such size, shape and location of features as argued. The appellants only recite "an etching parameter data" in the claim. The appellants do not define a specific etching parameter.

Appellant further argue that "the microscope techniques as taught in Su are expensive, time consuming...when comparing to the optical system of the subject invention". This argument is not persuasive. Su clearly teaches the advantages of his invention is improving critical dimension (CD) during the etching process. The examiner still maintains that it is obvious to modify Eriguchi in view of Su by using feed-forward control data since it will improve critical dimension.

Respect to claim 25, the appellants argues that the cited reference do not teach or suggest, "partitioning a wafer into one or more grid blocks". The examiner disagrees. Su clearly disclose a means for partitioning a wafer into individual "cells" of the matrix (col. 5 lines 6-18, Fig 1, read on "partition a wafer into one or more grid block"). Once the wafer is partitioned into one or more grid blocks, it is possible to sense the acceptability of etching in at least one of the one or more grid blocks.

The appellants further argue, "Jahns does not teach or suggest means for controlling the etching of a wafer portion. According to appellants, "utilizing Jahns, etching of an entire wafer can be controlled, but etching a wafer portion cannot be controlled". The examiner disagrees. The appellants do not define the size, shape or position that "a wafer portion" should be in claim 25. The front surface of the wafer can

be interpret as "a wafer portion", since the wafer must have a front side, back side and the edge.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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June 23, 2004

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